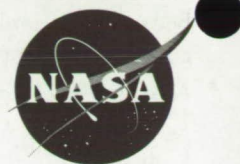
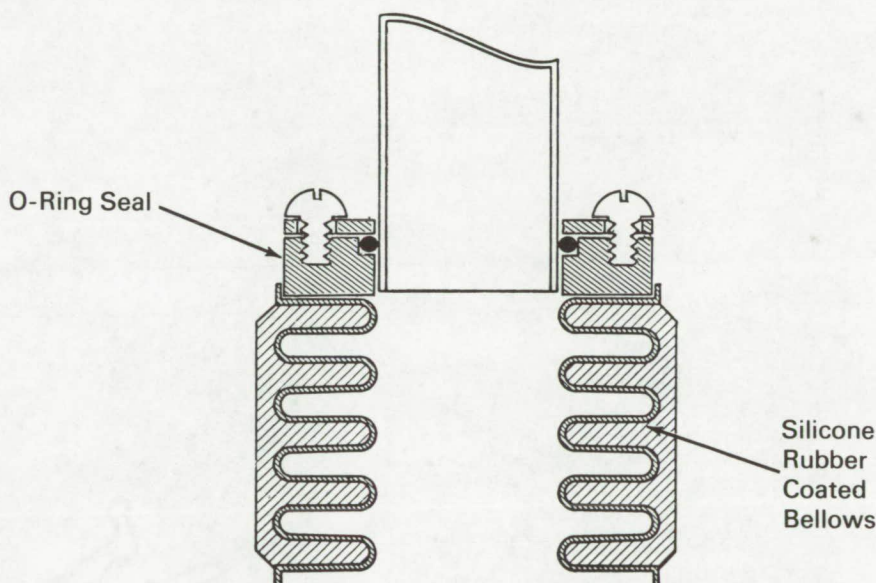


NASA TECH BRIEF



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Rubber-Coated Bellows Improves Vibration Damping in Vacuum Lines



The problem:

To design a compact vibration damping system for use in vacuum lines. Rubber hose and metal bellows are frequently employed for vibration damping. While the rubber hose is generally adequate for small systems (where vacuum connections are under one and one-half inches in diameter), they become cumbersome and stiff due to wall thickness or reinforcement in larger diameter applications. The metal bellows becomes stiff when evacuated (thereby losing some of its damping properties) and it is subject to fatigue failure after continued cycling.

The solution:

A rubber-coated bellows with a sliding O-ring connector, presents a metallic surface to the vacuum

system and combines flexibility with the necessary stiffness.

How it's done:

The vibration damping assembly consists of a silicone rubber-coated bellows and a sliding O-ring seal. The rubber coating on the bellows is a room-temperature vulcanizing silicone rubber adhesive which ensures that the rubber is not forced out of the convolutions of the bellows. Since the adhesive rubber compound cures by absorbing moisture from the air, it is necessary to make several thin applications and allow up to 48 hours of curing time per application. The rubber is applied with the bellows extended to ensure complete filling of the convolutions.

(continued overleaf)

The sliding O-ring seal is attached to the rubber-coated bellows and provides good axial damping because of its high compliance and small area of contact for vibration transmission.

Notes:

1. The sliding O-ring need not be permanently attached to the rubber-coated bellows. Any good vacuum connector can be used to mate the two; however, the sliding O-ring seal gives optimum performance.
2. The device has several advantages: protection against physical damage, less likelihood of fatigue failure, no plastic deformation, and easy mating of nonparallel lines.

3. Inquiries concerning this innovation may be directed to:

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Cleveland, Ohio, 44135
Reference: B66-10187

Patent status:

No patent action is contemplated by NASA.

Source: R. J. Smith and D. E. Hegland
of Lewis Research Center
(Lewis-273)